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*Clinical Study*

# Improvement in Functional Ability and Quality of Life Takes Place among Patients with Supraspinatus Tendinitis Regardless of the Type of Intervention

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*Objectives*. The purpose of this study is to investigate the functional ability and state of health before and after three different treatments of patients ($n = 156$) with shoulder problems. *Design*. This is a comparative study using convenience sampling and Shoulder Rating Questionnaire, the Short Form-36 Health Survey self-evaluation questionnaires, and metabolic equivalent (MET), prior to and after intervention. The patients in Group 1 had an arthroscopic operation while Group 2 had an open acromioplasty. The patients in Group 3 had merely received conservative treatment. *Results*. Improvement has occurred regardless of the type of intervention. However, a change is notable less evident in the Conservative group, which at least in part can be explained by their higher initial scores (measurement 1); their situation has simply been better already from the start, and this is perhaps why they have not been placed onto an operation waiting list. *Conclusion*. Even if conservative treatment appears to result in comparatively poorer outcomes, the role of physiotherapy should not be disregarded. Physiotherapy cannot replace essential surgical operations, but physiotherapy is able to significantly alleviate patients' experiences of pain.

## 1. Introduction

Shoulder pain is the result of many factors, including physical load and the psychosocial work environment [1]. Subacromial impingement syndrome (SIS) is the most common cause of shoulder pathology. Pain and dysfunction arise during activities in which the arm works above shoulder level at work, during daily activities or exercise and sport [2]. SIS encompasses several types of subacromial pathology including subacromial bursitis, inflammation of rotator cuff tendons, calcifying tendinitis, or even partial or total rupture of rotator cuff tendons. These various problems may cause similar symptoms and may often be distinguished from one another only through various imaging studies or an arthroscopic examination [3].

The purpose of the treatment is to manage pain and resolve mechanical problems so that function is improved. The goal of the conservative treatment is to alleviate pain and improve function through the reduction of swelling and the balancing of the forces in the muscles that depress the humerus. If conservative treatment fails after six months, then operative treatment is considered an option including the debridement of subacromial space and acromioplasty [4]. Clinical diagnosis must be based on objective measurements added by subjective experience of the problem. A visual analogue scale (VAS) evaluates numerically the intensity of the patient's pain [5]. Various other subjective self-evaluation measuring instruments also exist. The term subjective, however, may sound negative. Yet, in principle, a self-evaluation made using a relevant instrument can be more objective than an objective measurement analyzed by another person. Thus, in order to assess the results of surgery or other intervention, the patient's perspective is crucial [6]. In a previous literature review of 34 clinical studies

the results of surgery from patients undergoing arthroscopic and acromioplasty operation are similar [7]. However, a recent but limited ($n = 60$) prospective study shows better results for patients undergoing an arthroscopic operation [8]. Exercise therapy is a regular component in management of musculoskeletal disorders. There is insufficient evidence to support or refute the effectiveness of exercise therapy for patients with shoulder complaints [9].

The purpose of this study was to investigate if there is improvement in the functional ability and the quality of life among patients with supraspinatus tendinitis depending on the type of intervention. The ultimate target is to analyze the situation of patients in today's healthcare system. Our hypothesis is that improvement in functional ability and quality of life takes place among patients with supraspinatus tendinitis regardless of the type of intervention.

## 2. Participants and Methods

This is a comparative observational study using convenience [10] sampling, prior to and after intervention during 21.11.2005–30.9.2007. The study follows the typical treatment given in the geographical region studied. For ethical reasons, the groups were not randomized since the purpose of the study is to follow the "paths of the patients" into different types of treatment (in reality). Permission for this study has been applied for and granted.

*2.1. Participants.* The target group comprised of patients from the northern part of Western Finland who were diagnosed with a supraspinatus tendinitis. The patients, who provided written consent, were recruited from waiting lists of primary healthcare centres, specialist healthcare, or private healthcare. The participants filled in the Shoulder Rating Questionnaire (SRQ; [11]) and the Short Form-36 Health Survey (SF-36; [12]) self-evaluation questionnaires both prior to and after intervention; see Figure 1.

*2.2. Intervention.* The patients in Group 1 (arthro) have undergone an arthroscopic surgery while those in Group 2 (Neer) have undergone an open acromioplasty surgery. Both groups have also received physiotherapy. The patients in Group 3 (cons) have merely received conservative treatment mainly consisting of physiotherapy and, when needed, corticosteroids. The Neer group participated in a structured physiotherapy model that embraces Kron's principles [13]. The physiotherapy in the Arthroscopic and Conservative groups is not realizable here since is has varied as far as both length and content are concerned.

*2.3. Outcome Measures.* Measuring instruments can be classified as being either generic or specific. Generic measuring instruments are used to measure, for example, quality of life. The results provide a perspective on a patient's physical and mental health. Generic health measuring instruments are less sensitive to changes in a patient's specific state of health than specific measuring instruments. Disease or joint specific self-evaluation instruments are constructed to evaluate those areas of health that are directly related to the primary complaint. When a significant change is seen in the measurement results, it reflects the changes in the patient's state of health [14, 15]. In this study, the SRQ has been used as a specific measuring instrument and as a self-administered questionnaire. It assesses symptoms and shoulder function through the domains of Global assessment, Pain, Daily activities, Leisure time/Sport, Work, Satisfaction, and Areas for Improvement. A total score is arrived at through the separate grading and weighting of each domain with a high score indicating an elevated level of well-being, that is to say good functional ability and absence of pain. Two questions pertaining to patients' satisfaction and improvement are also included in the questionnaire. The questionnaire has been found to be valid, reliable, and responsive to clinical change. While the SRQ is not diagnosis specific, it is adaptable for use with patients either undergoing an operation or receiving conservative treatment [8]. The SRQ-S, a Swedish-language version [16], and the SRQ-FI, a Finnish-language version, both adapted specifically for use in Finland, and test-retested [17] are used in this study.

In order to estimate physical ability in the domains Leisure time/Sport and Work, metabolic equivalent (MET) values were used. The physical stress of everyday occupational physical activity (OPA), including sick leave and pension, leisure-time physical activity (LTPA), and selected variables from home physical activity (HPA) have been classified into MET values in accordance with the extensive database of a physical activity analysis program (MetPro 2.03.9 MX†). MetPro's database is integrated and harmonized from previously published power (MET) values. One metabolic equivalent (MET) is defined as the amount of oxygen consumed while sitting at rest and is equal to 3.5 mL $O_2$ per kilogram body weight multiplied by minutes. In analyses, OPA, LTPA, HPA, and MET values have been measured. The highest MET (HMET) of an OPA or LTPA value indicates the peak of physical stress in an individual's life [18–22].

This study has used the Medical Outcomes Study Short Form, the SF-36, as a generic measuring instrument. The SF-36 consists of different domains, Physical Function, Role-Physical, Bodily Pain, General Health, Vitality, Social Function, Role-Emotional, and Mental Health, and encompasses a total of 36 variables. A multipurpose, short-form health survey, the SF-36, consists of 36 questions and results in an 8-scale profile of functional health and well-being scores, psychometrically based physical and mental health summary measures, and a preference-based health utility index. The SF-36 is a generic measuring instrument and as such does not focus on specific age, disease, or treatment group. The SF-36 works well in surveys of general and specific populations, allowing for the comparison of the relative burden of disease and distinguishing the health benefits that a wide range of different treatments provide [23–25]. This measuring instrument has also been translated into both Swedish [12] and Finnish and adjusted to the conditions relevant to the geographical area where the study took place [26].

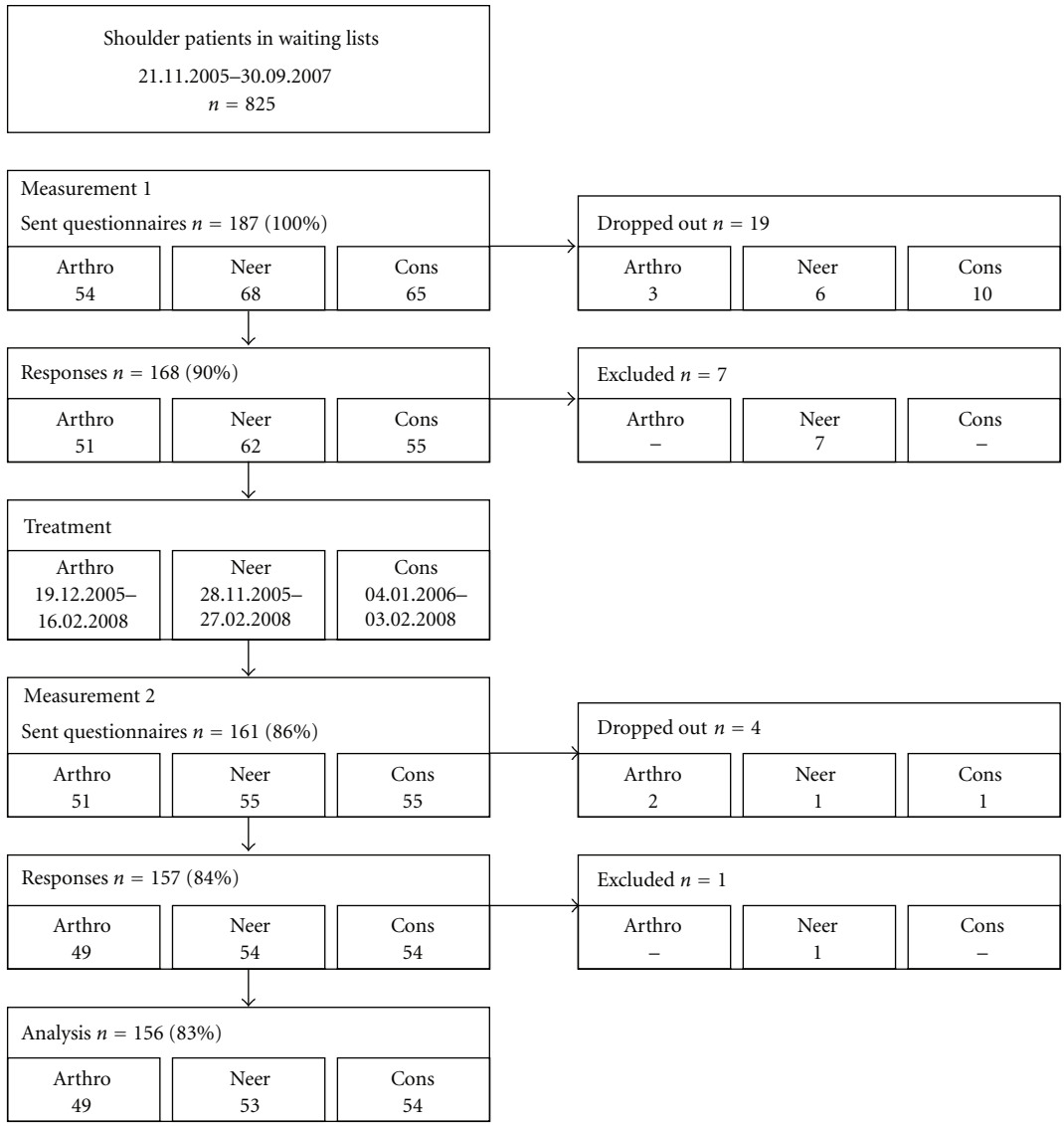


Figure 1: Study design and participant flowchart.

*2.4. Data Analysis.* In order to define the size of the target group, a statistical power calculation was made before the study. We selected pain according to the VAS scale as the main variable, which gave a standard deviation of 1, the power 0,80, and a significance of 0,05. According to the calculation, the different groups should consist of 45 people. All statistics were calculated using the SPSS 18 statistical software. A paired $t$-test was used so that changes in the various domains between measurements and groups could be compared. In order to see whether differences within and between the groups contain repeated measures, analysis of variance (ANOVA) has been used.

## 3. Results

*3.1. Flow of Participants.* Prior to intervention, 187 patients received questionnaires, 168 of which were analyzed. Three patients reported that they did not wish to participate in the study, two questionnaires were incomplete, and 14 patients failed to respond. Furthermore, seven patients were excluded from the study; five were diagnosed with a massive rotator cuff rupture and deemed inoperable, while two cancelled their scheduled open reconstructions and chose arthroscopic operations instead. After intervention, questionnaires were sent to 161 patients. Of these, three patients did not reply despite reminders and one patient had suffered a serious illness and did not wish to continue with the study; one patient returned the questionnaires after the data collection period had ended and was therefore excluded from the study; see Figure 1.

In total, 156 patients were included in this study. 69 of them were male and 87 female.

*3.2. Patient Background.* The patients' background variables can be seen in Table 1 below. The average length of time between a patient's surgery and the date of the second

Table 1: Patient background variables.

| | Arthroscopic ($n = 49$) | Neer ($n = 53$) | Conservative ($n = 54$) |
|---|---|---|---|
| Gender, male/female ($n$) | 20/29 | 31/22 | 18/36 |
| Age, mean (range) | 50,4 (27,8–72,2) | 50,2 (33,2–67,1) | 53,3 (35,2–76,0) |
| Treated shoulder, right/left | 30/19 | 29/24 | 35/19 |
| Occupational status | | | |
| Employed | 36 | 32 | 39 |
| Unemployed | 0 | 2 | 2 |
| Retired | 5 | 4 | 7 |
| On sick leave | 8 | 15 | 6 |
| Physiotherapy, number of times, mean (SD) | 12,7 (6,1) | 7,9 (5,8) | 8,2 (6,0) |
| Months between intervention and measurement 2, mean (SD) | 6,5 (2,1) | 7,1 (3,2) | 6,7 (1,7) |

measurement was six months for those undergoing an arthroscopic operation and seven months for those undergoing a Neer operation. For those receiving conservative treatment, a period of seven months has been calculated from the first day of treatment.

An analysis shows that there are no statistical differences between or within the groups as far as background is concerned.

*3.3. Shoulder Intensity at Work and during Leisure Time.* The study's MET values are presented in Table 2 below. Work intensity was the highest for the Arthroscopic group. After operation, this group returned to situations with approximately the same intensity. For the Neer group, work intensity increased significantly after operation. For the Conservative group, work intensity was approximately the same prior to and after treatment. The Conservative group reports the lowest level of work intensity but also reports the highest level of intensity during leisure time activities. Only the Arthroscopic group reports increased intensity after operation during leisure time activities.

*3.4. The Specific Shoulder Questionnaire.* The results from the specific measuring instrument of the study, the SRQ, show that the Conservative group has consistently higher initial scores except for the domain Daily Activities; see Table 3 below. The Arthroscopic and Neer groups have fairly identical scores.

All of the groups have consistently higher scores after intervention at measurement 2, with the scores for the Arthroscopic and Neer groups being relatively identical. However, the Conservative group has overall lower scores than the Arthroscopic and Neer groups and no significant improvement is seen in the domain Work. Especially individuals aged 50 and above reported small changes. Nothing else can be explained through the variable age. No substantial differences between the genders are seen in the groups apart from the fact that females assess the domain Work lower than men.

The patients estimated their satisfaction prior to intervention as being poor. The Conservative group was nonetheless slightly more optimistic regarding their situation. Table 4 below shows that the patients' satisfaction increased in all groups after intervention and that the increase was statistically significant ($***$).

Prior to intervention, pain constituted the main problem. Approximately 75% of the patients named Pain as the domain where they desired improvement. Work was next followed by Daily activities. Limitations within the domain Leisure time/Sport did not appreciably bother the patients. After intervention, the responses from the Conservative group differed from the Arthroscopic and Neer groups. Pain still dominates the Conservative group after intervention while the Arthroscopic and Neer groups have had their pain alleviated and now mainly stress the domains Work and Daily activities.

*3.5. The Generic Short Form Health Survey.* In the results of the generic measuring instrument, the SF-36, the components which gauge physical health, including the domain Pain, follow the same pattern as seen with the SRQ; see Table 5.

The Arthroscopic and Neer groups are essentially identical; they have lower scores prior to intervention but later demonstrate greater improvement. As regards the domain Mental Health, the greatest change is seen for the Neer group while the Arthroscopic group reported a greater improvement in the domain Social Function. Pertaining to gender, differences can be seen between the groups regarding improvement. Females in the Arthroscopic group report significant improvement in the domains Role-Physical and Physical Function while the males in the Neer group also report similar improvement within these domains. In the Conservative group, the males' improvement was insignificant. Pertaining to age (<50 and >50), there are no noticeable differences. However, older patients in the Arthroscopic and Neer groups seem to experience somewhat larger improvements regarding, for example, the domain Social Function.

Table 2: Mean (SD), mean (SD) differences within, and mean (95% CI) differences between the groups between measurements 1 and 2 in the work intensity and leisure time intensity.

| Outcome | Groups | | | | | | Difference within groups | | | Difference between groups | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Measurement 1 (before) | | | Measurement 2 (after) | | | M2 minus M1 | | | M1 | | | M2 | | |
| MET value | Arthro | Neer | Cones | Arthro | Neer | Cones | Arthro | Neer | Cones | A minus N | A minus C | N minus C | A minus N | A minus C | N minus C |
| OPA MET | $n = 43$ | $n = 34$ | $n = 36$ | | | | | | | | | | | | |
| | 2,3 | 1,8 | 1,8 | 2,3 | 2,2 | 1,7 | 0 (0,7) | 0,4* | 0,1 | 0,5 | 0,4 | −0,0 | 0,1 | 0,6 | 0,5 |
| | (1,2) | (0,9) | (0,4) | (1,1) | (1,1) | (0,4) | | (1,0) | (0,4) | (−0,0 to 1,1) | (−0,1 to 1,0) | (−0,6 to 0,5) | (−0,5 to 0,6) | (0,0 to 1,1) | (−0,1 to 1,1) |
| LTPA MET | 4,3 | 4,3 | 4,6 | 4,4 | 3,8 | 4,2 | 0,1 | −0,5 | −0,4 | −0,0 | −0,4 | −0,3 | 0,5 | 0,1 | −0,4 |
| | (1,6) | (1,7) | (1,6) | (1,5) | (1,3) | (1,4) | (1,2) | (1,4) | (1,4) | (−1,0 to 0,9) | (−1,3 to 0,5) | (−1,3 to 0,6) | (−0,3 to 1,3) | (−0,7 to 0,9) | (−1,2 to 0,4) |
| HMET | 4,4 | 4,3 | 4,6 | 4,5 | 4,0 | 4,2 | 0,1 | −0,4 | −0,4 | 0,1 | −0,2 | −0,3 | 0,5 | 0,3 | −0,3 |
| | (1,5) | (1,7) | (1,6) | (1,5) | (1,2) | (1,4) | (1,3) | (1,4) | (1,4) | (−0,8 to 1,0) | (−1,1 to 0,7) | (−1,3 to 0,6) | (−0,2 to 1,3) | (−0,5 to 1,0) | (−1,1 to 0,5) |

Statistical significance: * = $P < 0,05$, ** = $P < 0,01$, and *** = $P < 0,001$.

Table 3: Mean (SD), mean (SD) differences within, and mean (95% CI) differences between the groups between measurements 1 and 2 in the various SRQ domains.

| Outcome | Groups | | | | | | Difference within groups | | | Difference between groups | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Measurement 1 (before) | | | Measurement 2 (after) | | | M2 minus M1 | | | M1 | | | M2 | | |
| | Arthro | Neer | Cones | Arthro | Neer | Cones | Arthro | Neer | Cones | A minus N | A minus C | N minus C | A minus N | A minus C | N minus C |
| Domain (Range: min–max) | | | | | | | | | | | | | | | |
| Global assessment (0–15) | $n = 46$ 5,2 (2,8) | $n = 49$ 5,2 (2,4) | $n = 50$ 7,2 (3,8) | 11,7 (2,6) | 11,3 (3,8) | 9,4 (3,7) | 6,4*** (3,9) | 6,1*** (3,8) | 2,1*** (4,1) | 0 (−1,5 to 1,5) | −2,2 (−3,7 to −0,6) | −2,2 (−3,7 to −0,7) | 0,3 (−1,4 to 1,9) | 2,2 (0,5 to 3,9) | 1,9 (0,2 to 3,6) |
| Pain (8–40) | $n = 49$ 17,0 (5,7) | $n = 53$ 16,8 (4,9) | $n = 54$ 20,4 (6,5) | 32,5 (6,7) | 31,2 (8,3) | 27,9 (7,7) | 15,5*** (8,7) | 14,5*** (8,2) | 7,4*** (7,8) | 0,2 (−2,6 to 3,0) | −3,5 (−6,3 to −0,7) | −3,7 (−6,4 to −0,9) | 1,4 (−2,3 to 5,1) | 4,6 (0,9 to 8,3) | 3.2 (−0,4 to 6,9) |
| Daily activities (4–20) | $n = 49$ 13,7 (2,6) | $n = 53$ 12,2 (2,9) | $n = 54$ 13,4 (3,3) | 17,9 (2,5) | 17,6 (3,3) | 16,3 (3,1) | 4,2*** (3,0) | 5,4*** (3,8) | 2,9*** (3,9) | 1,5 (0,0 to 3,0) | 0,3 (−1,1 to 1,8) | −1,2 (−2,6 to 0,2) | 0,4 (−1,1 to 1,8) | 1,6 (0,2 to 3,1) | 1,3 (−0,2 to 2,7) |
| Leisure time/Sport (3–15) | $n = 48$ 7,6 (2,8) | $n = 53$ 7,1 (3,0) | $n = 51$ 7,9 (2,6) | 12,2 (2,8) | 11,9 (3,4) | 10,5 (3,0) | 4,6*** (3,1) | 4,7*** (3,7) | 2,5*** (3,2) | 0,5 (−0,9 to 1,9) | −0,4 (−1,8 to 0,9) | −0,9 (−2,3 to 0,4) | −0,3 (−1,2 to 1,8) | 1,6 (0,1 to 3,1) | 1,3 (−0,2 to 2,8) |
| Work (2–10) | $n = 32$ 6,1 (2,2) | $n = 27$ 6,3 (2,4) | $n = 35$ 7,2 (2,0) | 8,8 (1,8) | 8,7 (1,7) | 7,9 (2,2) | 2,6*** (2,4) | 2,4*** (2,9) | 0,6 (2,0) | −0,0 (−1,4 to 1,3) | −0,9 (−2,1 to 0,3) | −0,9 (−2,2 to 0,4) | 0,1 (−1,1 to 1,3) | 0,5 (−0,7 to 1,7) | 0,4 (−0,7 to 1,6) |
| Total points (17–100) | $n = 49$ 46,7 (12,3) | $n = 53$ 44,7 (11,2) | $n = 54$ 54,3 (15,5) | 81,3 (15,0) | 78,8 (19,7) | 70,2 (17,5) | 34,5*** (16,4) | 34,1*** (19,3) | 15,9*** (18,2) | 2,0 (−4,4 to 8,5) | −7,4 (−13,8 to −1,0) | −9,4 (−15,7 to −3,2) | 2,2 (−6,4 to 10,8) | 11,5 (2,9 to 20,0) | 9,3 (0,9 to 17,6) |

Statistical significance: * = $P < 0,05$, ** = $P < 0,01$, and *** = $P < 0,001$.

Table 4: Satisfaction and areas for improvement as reported by the groups.

| | Arthroscopic ($n = 49$) | | Neer ($n = 53$) | | Conservative ($n = 54$) | |
|---|---|---|---|---|---|---|
| | Measure 1 | Measure 2 | Measure 1 | Measure 2 | Measure 1 | Measure 2 |
| Satisfaction | | | | | | |
| Poor | 40 | 1 | 44 | 4 | 34 | 12 |
| Fair | 6 | 6 | 8 | 10 | 11 | 22 |
| Good | | 14 | | 11 | 3 | 7 |
| Very good | | 11 | | 12 | | 4 |
| Excellent | 1 | 8 | | 13 | 1 | 3 |
| No answer | 2 | 4 | 1 | 3 | 5 | 6 |
| Areas for improvement | | | | | | |
| Pain | 32 | 10 | 39 | 9 | 28 | 22 |
| Daily activities | 1 | 7 | 3 | 10 | 5 | 5 |
| Leisure time activities | 3 | 7 | | 9 | 4 | 7 |
| Work | 7 | 13 | 7 | 11 | 5 | 6 |
| No answer | 2 | 9 | 1 | 14 | 8 | 10 |
| No ranking | 4 | 3 | 3 | | 4 | 4 |

## 4. Discussion

Improvement in functional ability and quality of life has taken place in all three groups regardless of the type of intervention. The two groups that had undergone surgery exhibit bigger changes. A significant association has been found amongst patients' self-evaluations of their own life quality, including problems and actual strength measurements. The prevalence of rotator cuff problems is predictive of decreased physical life quality [14, 15].

This study describes the reality of today's shoulder patients in Finland. Randomization has not been possible due to the various background variables, but internally the groups are fairly similar, nor have the patients in principal been able to choose for themselves which treatment they would like to receive. Instead, they have been allocated care in accordance with the established practice within public medical service. Improvement has taken place regardless of the type of intervention used. However, change is notably less evident in the Conservative group, which can at least in part be explained by the higher initial scores of the patients in that group (measurement 1); their situation has simply been better already from the start and this is perhaps why they have not been placed onto an operation waiting list. A long-term review of their situation would be needed in order to assess how these patients manage in the future. Furthermore, conservative treatment is not as comprehensive as an operation, which can result in patients not experiencing sucha drastic change in their situation. Especially male patients would seem to benefit from more concrete and prompt solutions.

Neer was the first to use the term SIS and maintained that 100% of SIS and 95% of rotator cuff pathology were caused by impingement of the subacromial space [27]. SIS means that the supraspinatus tendon at the anterior third of the acromion is compressed against the coracoacromial ligament [2, 28]. Several other studies have found that 70–90% of those who have undergone a Neer operation report their satisfaction with the procedure as being good or excellent [29]. The results of this study also indicate such a tendency (Table 4). The Arthroscopic and Neer groups in this study largely show identical results, which is to be expected according to the literature reviewed. The benefit of arthroscopic treatment is that rehabilitation can begin earlier in that complete detachment of the deltoid does not occur [7]. It is essential that the orthopaedic surgeon is experienced and skilled. The surgery method depends on the surgeon's own preferences and is actually less important. The trend is to prefer less intrusive procedures such as arthroscopic treatments, where the diagnosis is also more specific.

This study does not address the issue of cost in conjunction with shoulder problems. The majority of shoulder operations nowadays will be done, regardless of specific method, at day surgeries. Differences do exist as regards the cost of the follow-up care. Some patients receive physiotherapy through private healthcare providers and thus bear the majority of costs themselves, but even those who receive follow-up care by means of public healthcare only pay a fraction of the overall cost.

Shoulder pain is considered to be the second most common acute musculoskeletal problem treated within primary healthcare and as such it constitutes a significant problem for public medical service [30, 31]. The primary goal of treatment should be to alleviate pain and restore function [28]. The pain that patients experience is without question the greatest problem for shoulder patients. In addition to being continuous, shoulder pain can also influence various areas of daily life negatively. All of the groups in this study reported significant improvements in their experienced level of pain but many of those in the Conservative group still wished for further pain alleviation. Pain can also strongly influence other life domains.

Table 5: Mean (SD), mean (SD) differences within, and mean (95% CI) differences between the groups between measurements 1 and 2 in the various SF-36 domains.

| Outcome (max. point) | Groups | | | | | | Difference within groups | | | Difference between groups | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Measurement 1 (before) | | | Measurement 2 (after) | | | M2 minus M1 | | | M1 | | | M2 | | |
| | Arthro | Neer | Cons | Arthro | Neer | Cons | Arthro | Neer | Cons | A minus N | A minus C | N minus C | A minus N | A minus C | N minus C |
| Physical Function (100) | $n = 49$ | $n = 53$ | $n = 54$ | $n = 49$ | $n = 53$ | $n = 54$ | | | | | | | | | |
| | 72,1 (14,1) | 73,4 (12,0) | 74,1 (15,9) | 82,9 (16,5) | 86,4 (16,0) | 79,9 (14,6) | 10,8*** (12,4) | 13,0*** (16,2) | 5,8*** (12,6) | −1,3 (−8,2 to 5,6) | −2 (−8,9 to 4,9) | −0,7 (−7,4 to 6,0) | −3,5 (−11,2 to 4,2) | 3,0 (−4,6 to 10,7) | 6,5 (−1,0 to 14,0) |
| Role-Physical (100) | $n = 47$ | $n = 51$ | $n = 54$ | $n = 48$ | $n = 52$ | $n = 54$ | | | | | | | | | |
| | 18,6 (31,5) | 21,1 (32,9) | 32,2 (39,5) | 62,5 (42,2) | 64,9 (43,2) | 56,5 (42,1) | 44,0*** (44,8) | 44,0*** (47,8) | 24,3*** (41,2) | −2,5 (−19,9 to 15,0) | −13,6 (−30,1 to 3,6) | −11,2 (−28,1 to 5,7) | −2,4 (−23,4 to 18,6) | 6,0 (−14,8 to 26,9) | 8,4 (−12,0 to 28,8) |
| Bodily Pain (100) | $n = 49$ | $n = 53$ | $n = 54$ | $n = 49$ | $n = 52$ | $n = 54$ | | | | | | | | | |
| | 36,0 (20,4) | 33,1 (17,6) | 41,9 (21,9) | 71,5 (23,3) | 68,8 (26,0) | 63,4 (24,3) | 35,5*** (27,8) | 36,0*** (25,4) | 21,5*** (24,6) | 2,9 (−6,9 to 12,8) | −5,9 (−15,7 to 3,9) | −8,9 (−18,5 to 0,7) | 2,6 (−9,3 to 14,6) | 8,0 (−3,8 to 19,9) | 5,4 (−6,2 to 17,1) |
| General Health (100) | $n = 49$ | $n = 53$ | $n = 54$ | $n = 49$ | $n = 53$ | $n = 54$ | | | | | | | | | |
| | 61,7 (18,5) | 62,2 (20,1) | 61,8 (20,9) | 65,4 (20,3) | 67,5 (18,7) | 65,1 (20,1) | 3,7 (15,4) | 5,3* (16,8) | 3,2 (14,7) | −0,5 (−10,3 to 9,2) | −0,1 (−9,8 to 9,6) | 0,4 (−9,1 to 9,9) | −2,1 (−11,8 to 7,5) | 0,3 (−9,3 to 10,0) | 2,5 (−7,0 to 11,9) |
| Vitality (100) | $n = 48$ | $n = 53$ | $n = 54$ | $n = 49$ | $n = 52$ | $n = 54$ | | | | | | | | | |
| | 59,4 (23,1) | 55,1 (21,1) | 54,1 (24,3) | 68,3 (20,9) | 68,9 (21,0) | 61,8 (21,5) | 9,2*** (16,3) | 14,3*** (18,8) | 7,1*** (20,6) | 4,3 (−7,0 to 15,5) | 5,3 (−5,9 to 16,5) | 1,0 (−9,9 to 11,9) | −0,7 (−11,1 to 9,7) | 6,4 (−3,9 to 16,7) | 7,1 (−3,1 to 17,2) |
| Social Function (100) | $n = 49$ | $n = 53$ | $n = 54$ | $n = 49$ | $n = 52$ | $n = 54$ | | | | | | | | | |
| | 76,8 (18,7) | 81,4 (22,3) | 79,2 (24,8) | 89,5 (15,8) | 90,1 (19,1) | 83,3 (25,5) | 12,7*** (20,2) | 8,4*** (21,2) | 4,2 (21,8) | −4,6 (−15,4 to 6,3) | −2,4 (−13,2 to 8,4) | 2,2 (−8,4 to 12,8) | −0,6 (−10,8 to 9,6) | 6,2 (−3,9 to 16,3) | 6,8 (−3,1 to 16,7) |
| Role-Emotional (100) | $n = 47$ | $n = 51$ | $n = 53$ | $n = 48$ | $n = 50$ | $n = 54$ | | | | | | | | | |
| | 60,6 (41,9) | 68,6 (39,7) | 61,0 (41,2) | 80,5 (32,9) | 88,0 (28,4) | 70,1 (39,9) | 20,6*** (41,7) | 19,4*** (38,2) | 9,4 (36,6) | −8,0 (−28,4 to 12,5) | −0,4 (−20,6 to 19,9) | 7,6 (−12,2 to 27,5) | −7,4 (−24,5 to 9,7) | 9,6 (−7,2 to 26,4) | 17,0* (0,4 to 33,6) |
| Mental Health (100) | $n = 48$ | $n = 53$ | $n = 54$ | $n = 49$ | $n = 52$ | $n = 54$ | | | | | | | | | |
| | 72,0 (19,1) | 74,5 (18,9) | 72,0 (19,9) | 78,0 (17,8) | 82,8 (15,5) | 76,9 (18,5) | 6,1*** (13,6) | 8,7*** (15,0) | 4,9* (14,8) | −2,5 (−12,0 to 7,0) | 0,0 (−9,4 to 9,5) | 2,5 (−6,7 to 11,8) | −4,8 (−13,3 to 3,7) | 1,1 (−7,3 to 9,6) | 5,9 (−2,4 to 14,3) |

Statistical significance: * = $P < 0,05$, ** = $P < 0,01$, and *** = $P < 0,001$.

The study's specific measuring instrument, the SRQ, also shows clear improvements after treatment in the domain Work for the Arthroscopic and Neer groups but not for the Conservative group. A similar trend can be seen as regards measurements of intensity of physical activities. The OPA MET values have not changed while the LTPA MET values have actually decreased. One explanation for this could be that the Conservative group's shoulder problems were not mechanically resolved, resulting in them being most noticeable at work and during other activities. Receiving conservative treatment alone is not sufficient in cases of anatomical impingement. Nevertheless, according to the SRQ, significant improvements in symptoms and functions take place within all domains.

The generic health measuring instrument, the SF-36, shows decreased quality of life for the Conservative group in the domains Social-Function and Role-Emotional. One explanation could be this group's continued pain while another could be that the SF-36 does not only focus on shoulder problems. A patient's overall health is influenced by his/her shoulder problems, and even other factors can influence health, which the modest improvements in the domain General Health can be an expression of. It is, however, difficult to speculate about the differences seen between the Arthroscopic and Neer groups.

Even if conservative treatment appears to result in comparatively poorer outcomes, the role of physiotherapy should not be disregarded. While physiotherapy cannot replace essential surgical operations, physiotherapy is nonetheless able to significantly alleviate patients' experiences of pain, patently helping most of those for whom an operation is not deemed necessary. Furthermore, a physiotherapist can function as a type of support person and thus work as a link between a patient and the healthcare system. Additionally, a physiotherapist is in all likelihood more readily accessible and can dedicate more time to individual patients.

Nonetheless, it is perhaps not especially useful as a rule and first step in the treatment of shoulder patients to send patients to physiotherapy sessions that can continue for several months. A comprehensive initial diagnosis, without regard for the incurrence of extra costs, and subsequent prompt treatment is to the benefit of shoulder patients and, in the long run, society, the healthcare system included.

The SRQ could potentially work as a measuring instrument whereby the criteria for the determination of treatment, specifically the choice between conservative and surgical treatment, could be established but long-term research is needed before such can be realized. Additionally, detailed randomized studies of how physiotherapy can be used in conjunction with surgical treatment should be done.

It is known that patients' preoperative expectations of shoulder surgery affect both the decision to proceed with surgery and how patients assess the outcomes of surgery [32]. Thus, the SRQ should be further developed to include a question pertaining to patients' expectations and views regarding recovery, so that a comparison of patients' pre- and posttreatment attitudes can occur. A patient-derived questionnaire could eventually help to ensure a high level of patient consensus with surgeon outcome assessments after shoulder surgery. Patient-administered methods should continue to be evaluated as a means of shoulder patient assessment [33]. A point often remarked on is that the follow-up time for shoulder patients after treatment is often quite short [29]. This is also applicable in this study. It would be an interesting challenge to initiate a true longitudinal study.

The purpose of this study was to investigate the functional ability and state of health before and after three different treatments of patients with shoulder problems. The ultimate target was to analyze the situation of patients in today's healthcare system. This study confirms that through the use of relevant self-assessment instruments, valuable information is obtained regarding shoulder patients' experiences, which should serve as a guiding foundation for clinical work. An immediate and thorough first evaluation of the nature of the problem and the appropriate intervention required is of tremendous importance. Even if conservative treatment appears to result in comparatively poorer outcomes, the role of physiotherapy should not be disregarded.

## 5. Conclusion

Even if there is a significant improvement in functional ability and quality of life regardless of the type of intervention, the results in the Arthroscopic and Neer groups are rather similar and prove greater improvements. Thus, physiotherapy cannot replace essential surgical operations. However, physiotherapy is able to significantly alleviate patients' experiences of pain. The pain that patients experience is without question the greatest problem for shoulder patients. Therefore, in order to avoid lengthy and costly sick leave and prolonged pain, surgical treatment should be started without delay. Further evaluation of cost effectiveness is needed.

## Ethics Approval

The Malmska Municipal Health Care Centre and Hospital, Finland Ethics Committee approved this study (10.11.2005). All participants gave written informed consent before data collection began.

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